

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1-18. (Canceled)

19. (Currently Amended) A manufacturing method for an ink-jet recording head, which comprises: a passage-forming substrate having a pressure generating chamber formed thereon, which communicates with a nozzle orifice; and a piezoelectric element formed of a thin film and by a lithography method in a region corresponding to said pressure generating chamber via a vibration palate-plate constituting a portion of said pressure generating chamber, in which a passage-forming layer is provided between said passage-forming substrate and said vibration plate, and the passage-forming layer has a space portion formed in a region opposite to said pressure generating chamber, the manufacturing method of an ink-jet recording head comprising:
forming said passage-forming layer on said passage-forming substrate and imparting etching selectivity to a region that will be said space portion of the passage-forming layer,
forming said vibration plate on said passage-forming layer and forming a piezoelectric element on the vibration plate,
performing anisotropic etching for said passage-forming substrate from a surface opposite that having said passage-forming layer to form a penetrated portion at least to a region that will be said space portion of said passage-forming layer, etching said passage-forming layer

to form said space portion, and forming a pressure generating chamber opposite the space portion,~~and~~

joining a nozzle plate, having nozzle orifices, to the passage-forming substrate, and
thereby forming the ink-jet recording head.

20. (Original) The manufacturing method of an ink-jet recording head according to claim 19, wherein said passage-forming layer comprises polysilicon, and etching selectivity is imparted by doping boron onto a region other than the region that will be said space portion.

21. (Currently Amended) A manufacturing method of an ink-jet recording head, which comprises: a passage-forming substrate having a pressure generating chamber formed therein, which communicates with a nozzle orifice; and a piezoelectric element formed of a thin film and by a lithography method in a region corresponding to said pressure generating chamber via a vibration plate constituting a portion of said pressure generating chamber, in which a passage-forming layer that comprises of boron-doped polysilicon is provided between said passage-forming layer has a space portion formed in a region opposite said pressure generating chamber, the manufacturing method of an ink-jet recording head comprising:

forming a polysilicon layer on said passage-forming substrate;

doping boron onto a region other than a region in which said space portion of the polysilicon layer is formed to make said passage-forming layer;

forming said vibration plate on said passage-forming layer and forming a piezoelectric element on the vibration plate;

etching said passage-forming substrate from a surface opposite that having said passage-forming layer to form said pressure generating chamber;
etching entirely the region of said polysilicon layer other than the region having boron doped thereon from said pressure generating chamber to form said space portion; and joining a nozzle plate, having nozzle orifices, to the passage-forming substrate, and thereby forming the ink-jet recording head.

22. (Original) The manufacturing method of an ink-jet recording head according to claim 21, wherein the step of forming said pressure generating chamber and the step of forming said space portion are continuously performed.